



Attorney's Docket No.: 003558P018

Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

James M. Cleeves

U.S. Serial No: 09/746,341

Examiner: Cruz, Lourdes C.

Filed: December 22, 2000

Art Unit: 2827

For: CONTACT AND VIA
STRUCTURE AND METHOD OF
FABRICATION

Assistant Commissioner for Patents
and Trademarks
Washington, D.C. 20231

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PRELIMINARY AMENDMENT

Dear Sir:

In response to the Final Office Action mailed September 11, 2002 and the Request for Continued Examination (RCE) under 37 C.F.R. § 1.114 filed concurrently herewith, Applicant respectfully requests the Examiner to enter this preliminary amendment and consider the remarks prior to examination of the above referenced case.

FIRST CLASS CERTIFICATE OF MAILING

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on December 11, 2002
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Signature

December 11, 2002
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IN THE CLAIMS

Please amend the following claims:

1. (Amended) A contact a three dimensional memory device comprising:
a conductive film;
an opening formed through a plurality of film stacks of a three dimensional memory device, said opening having a top and bottom wherein said bottom is formed on said conductive film, said opening having a first sidewall and second sidewall wherein said first sidewall is opposite of said second sidewall, and wherein said first sidewall has a stair step configuration wherein said first sidewall is closer to said second sidewall at said bottom of said opening than at the top of said opening; and
a conductor formed on said stair step configuration said first sidewall of said opening and on said bottom of said opening on said conductive film.
2. The contact of claim 1 wherein said second sidewall has a second stair step configuration.
3. The contact of claim 1 wherein said continuous conductor is aluminum or aluminum alloy.
4. (Amended) The contact of claim 1 wherein said first sidewall has a slope (height:width) of less than 2:1.
5. (Amended) A contact in a three dimensional memory device comprising:
a contact opening formed through a plurality of film stacks of a three-dimensional memory, said contact having a bottom on an interconnection, said contact

opening having a first and second laterally opposite sidewalls, wherein said first sidewall comprises:

a first vertical side extending up from said bottom;

a first horizontal surface extending from said first vertical side to a second vertical side, said second vertical side further spaced from said second sidewall than said first vertical side;

a second horizontal surface extending from said second vertical side to a third vertical side wherein said third vertical side is spaced further from said second sidewall than said second vertical side; and

a conductor formed on said first sidewall and on said interconnection in the bottom of said contact opening.

6. The contact of claim 5 wherein said conductor is an aluminum or an aluminum alloy.

7. (Amended) A contact of a three dimensional memory device comprising:

a first and a second film stack of a three dimensional memory device said having a first part and a second part separated by a first gap, said first film stack having a top conductive film;

said second film stack formed on said first film stack, said second film stack having a first part and a second part separated by a second gap formed over said first gap so as to expose said top conductive film of said first film stack, said second film stack having a top conductive film; and

a conductive contact film formed on said top conductive film on said second film stack and on said top conductive film of said first film stack in said second gap.

8. The contact of claim 7 further comprising a third film stack having a top conductive film, said third film stack formed over said second film stack, said third film stack having a first part and a second part separated by a third gap over said second gap wherein said third gap is larger than said second gap so as to expose said top conductive film of said second film stack and wherein said continuous conductive film is formed on said top conductive film of said second film stack in said third gap.

9. (Amended) A contact comprising:

a first film stack having a first part and a second part separated by a first gap, said first film stack having a top conductive film wherein said first film stack comprises a top P+ silicon film formed on a silicide film which is formed on a P+ silicon film which is formed on a P- silicon film which is formed on a antifuse layer;

a second film stack formed on said first film stack, said second film stack having a first part and a second part separated by a second gap formed over said first gap so as to expose said top conductive film of said first film stack, said second film stack having a top conductive film; and

a continuous conductive contact film formed on said top conductive film on said second film stack and on said top conductive film of said first film stack in said second gap.

10. The contact of claim 9 wherein said second film stack comprises a top N+ silicon film formed on a silicide film which is formed on a N+ silicon film which is formed on a N- silicon film which is formed on a antifuse film.

11. (Amended) A contact comprising:

a first film stack having a first part and a second part separated by a first gap, said first film stack having a top conductive film;

a second film stack formed on said first film stack, said second film stack having a first part and a second part separated by a second gap formed over said first gap so as to expose said top conductive film of said first film stack, said second film stack having a top conductive film; and

a continuous conductive contact film formed on said top conductive film on said second film stack and on said top conductive film of said first film stack in said second gap wherein said first film stack comprises a top N+ silicon film formed on a silicide film which is formed on a N+ silicon film which is formed on a N- silicon film which is formed on a antifuse film.

12. The contact of claim 11 wherein said second film stack comprises a top P+ silicon film formed on a silicide film which is formed on a P+ silicon film which is formed on a P- silicon film which is formed on a antifuse layer.

13. (Amended) A contact comprising:

a first film stack having a first part and a second part separated by a first gap, said first film stack having a top conductive film;

a second film stack formed on said first film stack, said second film stack having a first part and a second part separated by a second gap formed over said first gap so as to expose said top conductive film of said first film stack, said second film stack having a top conductive film; and

a continuous conductive contact film formed on said top conductive film on said second film stack and on said top conductive film of said first film stack in said second gap wherein said continuous conductive contact film comprises a top P+ silicon film formed on a silicide film.

14. (Amended) A contact comprising:

a first film stack having a first part and a second part separated by a first gap, said first film stack having a top conductive film;

a second film stack formed on said first film stack, said second film stack having a first part and a second part separated by a second gap formed over said first gap so as to expose said top conductive film of said first film stack, said second film stack having a top conductive film; and

a continuous conductive contact film formed on said top conductive film on said second film stack and on said top conductive film of said first film stack in said second gap wherein said continuous conductive contact film comprises a top N+ silicon film formed on a silicide film.

15. The contact of claim 7 wherein said continuous conductive film is aluminum or an aluminum alloy.

26. The contact of claim 13 wherein said silicide film comprises titanium silicide.

27. The contact of claim 14 wherein said silicide film comprises titanium silicide.

28. (Amended) A contact comprising:

a contact opening having a bottom on an interconnection, said contact opening having a first and second laterally opposite sidewalls, wherein said first sidewall comprises:

a first vertical side extending up from said bottom;

a first horizontal surface extending from said first vertical side to a second vertical side, said second vertical side further spaced from said second sidewall than said first vertical plane;

a second horizontal surface extending from said second vertical side to a third vertical side wherein said third vertical side is spaced further from said second sidewall than said second vertical side; and

a continuous conductor formed on said first sidewall and on said interconnection in the bottom of said contact opening wherein said continuous conductor comprises a top p+ silicon film formed on a silicide film.

29. The contact of claim 28 wherein said silicide film comprises titanium silicide.

30. (Amended) A contact comprising:

a contact opening having a bottom on an interconnection, said contact opening having a first and second laterally opposite sidewalls, wherein said first sidewall comprises:

a first vertical side extending up from said bottom;

a first horizontal surface extending from said first vertical side to a second vertical side, said second vertical side further spaced from said second sidewall than said first vertical side;

a second horizontal surface extending from said second vertical side to a third vertical side wherein said third vertical side is spaced further from said second sidewall than said second vertical side; and

a continuous conductor formed on said first sidewall and on said interconnection in the bottom of said contact opening wherein said continuous conductor comprises a top n+ silicon film formed on a silicide film.

31. The contact of claim 30 wherein the silicide film comprises titanium silicide.

REMARKS

Status of Claims

The Examiner has rejected claims 1-8 and 15 as being anticipated by Lauvray et al. The Examiner has objected to claims 9-14 and 26-31 as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant has amended claims 9-14 and 26-31 include all of the limitations of the base claim and any intervening claims and as such, are now in a condition for allowance.

Claim Rejections - 35 U.S.C. § 112

The Examiner has rejected claim 4 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant has amended claim 4 to more particularly point out and distinctly claim the subject matter which Applicant regards as the invention. As such, Applicant respectfully requests the removal of the 35 U.S.C. § 112, second paragraph rejection of claim 4.

Claim Rejections – 35 U.S.C. § 102

The Examiner has rejected claims 1-8 and 15 under 35 U.S.C. § 102(e) as being anticipated by Lauvray et al. (US Patent 6,040,604). It is Applicant's understanding that Lauvray et al. fails to teach Applicant's invention as claimed in claims 1-8 and 15. In claims 1-8 and 15, Applicant claims a contact in a three dimensional memory which


includes "an opening formed through a plurality of film stacks of a three dimensional memory device". Applicant does not understand Lauvray et al. to teach an opening formed through a plurality of film stacks of a three dimensional memory device as claimed by Applicant. As such, Applicant respectfully requests the removal of the 35 U.S.C. § 102(e) rejections of claims 1-8 and 15 and seeks an early allowance of these claims.

If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: 12/11/02


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